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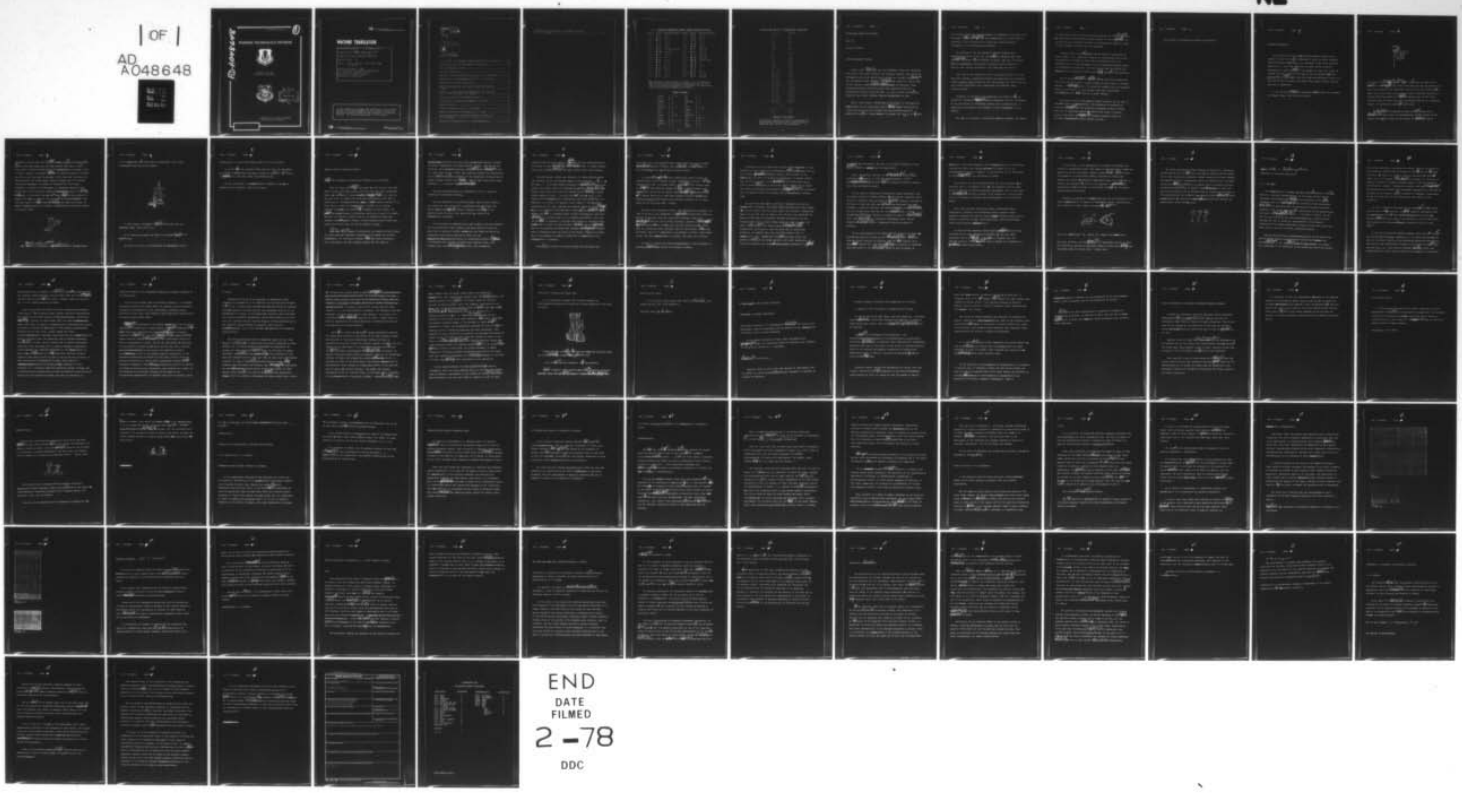

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FOREIGN TECHNOLOGY DIVISION

SCIENCE AND LIFE
(SELECTED ARTICLES)

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SCIENCE AND LIFE (SELECTED ARTICLES)

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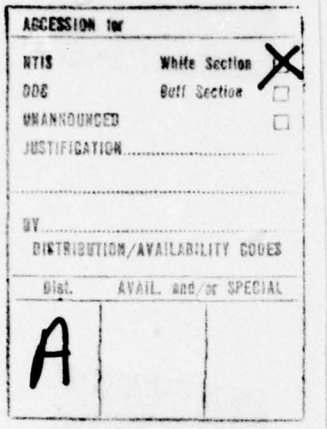

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere. When written as ë in Russian, transliterate as yë or ë. The use of diacritical marks is preferred, but such marks may be omitted when expediency dictates.

GREEK ALPHABET

Alpha	A	α		Nu	N	ν	
Beta	B	β		Xi	Ξ	ξ	
Gamma	Γ	γ		Omicron	O	o	
Delta	Δ	δ		Pi	Π	π	
Epsilon	E	ε		Rho	P	ρ	
Zeta	Z	ζ		Sigma	Σ	σ	ς
Eta	H	η		Tau	T	τ	
Theta	Θ	θ		Upsilon	T	υ	
Iota	I	ι		Phi	Φ	φ	
Kappa	K	κ		Chi	X	χ	
Lambda	Λ	λ		Psi	Ψ	ψ	
Mu	M	μ		Omega	Ω	ω	

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English
sin	sin
cos	cos
tg	tan
ctg	cot
sec	sec
cosec	csc
sh	sinh
ch	cosh
th	tanh
cth	coth
sch	sech
csch	csch
arc sin	$\sin^{-1}$
arc cos	$\cos^{-1}$
arc tg	$\tan^{-1}$
arc ctg	$\cot^{-1}$
arc sec	$\sec^{-1}$
arc cosec	$\csc^{-1}$
arc sh	$\sinh^{-1}$
arc ch	$\cosh^{-1}$
arc th	$\tanh^{-1}$
arc cth	$\coth^{-1}$
arc sch	sech^{-1}
arc csch	csch^{-1}
rot	curl
lg	log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

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Articles I-VIII.

LIFE AND MAGNETIC FIELD.

Sense organs. ~~Them~~ There are many that are different. These are "windows" into world. Into world external and internal. Through them enters the information about that which occurs around us, through them ~~enters~~ proceeds the information about ~~the fact~~ that ~~it~~ which occurs around us, across them go the infinite commands, which control work ~~superintendent~~ of organism. Sense organs distinguish color and odors, hear sounds and maintain equilibrium, perceive pain and heat .... Man is armed by many of these "windows" into world. Without them is unthinkable the life.

Earth. Giant magnet. Everything is conceived, is developed and ~~there~~ exists in its stationary field. ~~Without doubt~~ How does act it on liquid? Is there special "window" into the invisible world of magnetism? Where is it, always ~~whether~~ is opened, and can, so it be only

at the early stages of the development of organism? Or generally this "windows" long already ago? And was slammed shut it in some stage of evolution, after transmitting as relay race entire necessary information to the mechanism of heredity?

The problem of the interaction of living organism with magnetostatic field is not new. Already for many centuries people attempted to penetrate in this mystery of nature. Was here everything - and direct charlatanism and distant secret medicine of healing, were unique experiments, were fallacies and errors.

Each time it was obtained so that the touch of science to this agitating problem, yielding incidental and often even very important results, almost nothing gave for its own solution. As traces from the next impure experiments were established contradictory facts, doubtful proofs.

Gradually the problem of biomagnetism, not having lost its scientific sharpness, acquired doubtful reputation. But the development of the new methods of biological studies led to reactivation, it would seem, the forever left attempts to find key to this riddle.

But when in the facts, extracted by numerous studies, the effect

of stationary magnetic field on vital processes did obtain, ~~did~~ it would seem ~~#~~, experimental confirmation, before science in entire ~~increase~~ growth did become even more difficult problem. How nevertheless magnetic field it does influence living cell, the organism?

Recently were reveal~~detected~~ed special magnetic properties of nucleic acids - the compounds, playing the exceptional role in the transmission of hereditary signs and in metabolism. If it is confirmed that the open phenomenon is not bonded with foreign matter of ferromagnetic substances, then will appear hope to explain the ~~action~~/effect of magnetic field on the ~~quite~~ very intimate vital processes.

Who it knows, ~~should be~~ perhaps, ~~through~~ after several years the people even will learn with the aid of magnetic field to raise crops, to control heredity, to ~~amplify~~ intensify memory ! But thus far problem "life and magnetic field" is not solved. It will require even more considerable effort~~s~~/~~forces~~. And ~~above~~ on this it is worth working.

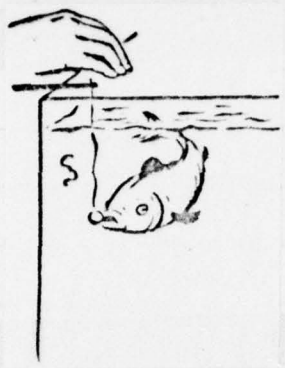
Man always lives in the magnetic field of earth. And we must to end~~lead~~ study its ~~action~~/effect. This requires the progress of technology, ~~bonded~~ connected with the creation of powerful magnetic fields. This must be explained before ~~men~~ people will leave to distant worlds. There they can ~~be met~~ encounter the colossal magnetic fields and virtually ~~full/total/~~complete absence of them.

The problem of biomagnetism awaits its solution !

CONVINCE THEMSELVES.

Of the fact that the fish receive magnetic field, can be convinced each. For this it is sufficient to have the glass aquarium (without metallic ~~fin~~ edges), the horseshoe or any other powerful magnet and ... very much patience. Are most better conducted experiments on gold crucian carp, it is possible to take both usual our crucian and carp. During first days in the new aquarium ~~of~~ fish nothing eat. Then they begin to eat the food, when hereabout there is no one, and finally is taken feed almost from hands. Arrived time of starting of experiment.

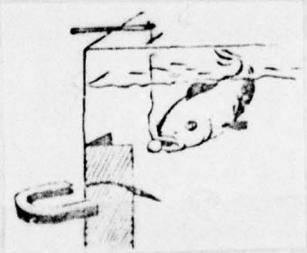
I. In one of the corners ~~angles~~ of aquarium, we ~~let us~~ lower the attached on filament bead, best of all red color.



Fish takes it for ~~scopk~~ mosquito larva, ~~it is~~ tried to eat it. Here we throw with a ~~series~~ number of living ~~cranks~~ mosquitoes, and fish, after leaving bead, ~~it~~ swallows it. The next portion of food fish again obtains only after pulling ~~for~~ on bead. And so each time. Do not forget, after finishing experiment, to extract bead from aquarium ! ~~Through~~ After several days, hardly after catching sight of bead, fish will continously pull by it, requiring reward. It learned "to earn" ~~to~~ for itself food.

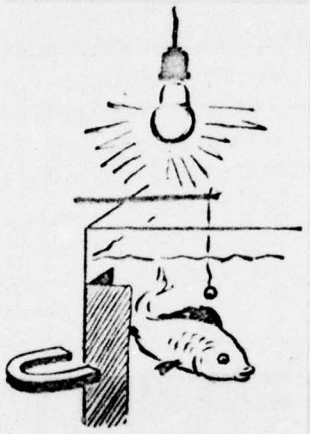
II. ~~The~~ A corner angle of aquarium we paste over ~~by~~ with opaque paper. ~~Putting~~ Lowering into water bead, is simultaneously brought magnet in the manner that ~~this~~ is shown in the figure. We ~~substitute~~ place magnet

carefully in order that the fish did not ~~of its~~ see it and would hear not it rustle. From this point on, the fish obtains feed only in such a case, when it pulls by bead during the ~~action~~ effect of magnet. Food is eaten - magnet is removed. ~~Through~~ After 2-3 minutes newly set up magnet we hold it not less than 30 seconds. If for this time fish does not focus attention on bead, magnet again is removed for 2-3 minutes. During one experiment the magnet is substituted 10-20 times. Remember: to conduct the experiments is necessary regularly once during day, in the strictly established ~~installed~~ hours. Do not give ~~fall by spirit~~, if initially fish ~~is~~ pull bead, both ~~also~~ in the presence of magnet and in its absence. one-two week of "training ~~aging~~" - and fish will begin "to ~~peck~~ bite" bead ~~in essence~~ mainly only under the effect of magnet. ~~Target~~ purpose is reached: is manufactured conditioned reflex to magnetic field.



III. ~~Thus~~ By the same method it is possible to ~~manufacture at~~ produced in other fish~~es~~ reflex

to the ~~world/~~light: ~~on~~ to table lamp or flashlight, and to then "remove~~/take~~" ~~by~~ its, acting magnet.



1) Fish became accustomed to ~~suffice~~ grab bead only with the ~~connected~~ lamp, turned on.

2) We substitute magnet and after 5-10 seconds ~~lights~~ we turn on ~~world/~~light.

3) After 30 seconds is extinguished the ~~world/~~light and we

remove magnet. If fish pulls bead, feed to it is not placed.

4) Let us ~~make~~ do this several times and see, that the fish under the effect of ~~world/~~light and magnet ceases to not ice bead, ~~but~~ and even if it ~~suffices~~ grabs it, then only after long "meditations".

In this experiment the ~~action/~~effect of magnet on fish is exhibited still brighter, than in the first.

Magnetic field, strange irritant,.

~~speaks~~ says the candidate of biological sciences Yu. A. Kholodov.

With the weak rustle ~~fish~~ rabbit runs away. But the cut out from body rabbit muscle, although living, will not stir even with thunderous shock. ~~In~~ What is the matter? Answer ~~response asserts itself~~ is suggested by itself: it does not hear. On muscle the sound acts not directly, but only in passing by on the ~~chain~~/network: ~~ear~~/ear ~~is the~~ nervous system. It is clear that to study the ~~action~~/effect of sound or any similar irritant (as ~~speak~~ say the scientists) necessary on this animal, for ~~which~~ which this ~~chain~~/network is preserved. Entirely is placed in another way with the electric current: here it is possible to take and separate organ/~~controls~~, muscles. Indeed nervous system itself puts muscle into action with the aid of electric current.

~~Much that~~ There is much in common of electricity with magnetic field. These are close physical phenomena. Regularly it to assume that ~~A~~ their ~~action~~/effect on organism is similar. ~~Seed~~ Alas! Was placed experiment after experiment, but even powerful magnet did not cause an

~~abbreviation~~/contraction in the isolated/~~insulated~~ muscle, although it clearly "shuddered" from weak electric current. Did come up the question: does ~~influence~~ generally magnet affect organism? ~~Can see~~ Perhaps it acts in a some other manner, rather than electric current? The explanation of this ~~they~~ was studied by the coworkers of the department of physiology of higher nervous activity MGU [~~Moscow~~ MGU - Moscow State University] under professor L. G. Voronin's ~~management/manage~~ leadership.

The way of investigation it indicated to us I. P. Pavlov's teaching of conditioned reflexes.

For our experiments we selected fishes. Why? We were based on the opinion of some scientists, considering that ~~the~~ fishes and birds, ~~being~~ start~~ed~~ing on ~~into~~ distant journeys, find ~~path~~ way on the magnetic field of earth. That means they must receive the ~~action~~/effect of magnet.

If we through the aquarium pass light current, then motionlessly the fish confronting will shudder, will swim several circles and again will be quieted. Neither ~~world~~/light nor sound nor magnet by themselves cause similar motions of fish. For the ~~consumption/production~~/generation of conditioned reflexes we began ~~became~~ to accompany each of these irritants with electric shock. For example, each time ~~including/world~~/turning on light, they transmitted

simultaneously electric current. ~~Through~~ After 5-10 such combinations the fish began to move, ~~as only~~ as soon as ~~was fired world~~ turned on light, no longer waiting until, when ~~it hits~~ shock it current. The same occurred with sound signals.

But with magnet nothing was obtained. 20 times simultaneously with electric shock they brought magnet to the aquarium ... ~~40~~ 30 ... ~~of~~ 40 times .... We already almost despaired to ~~manufacture~~ produced conditioned reflex, but finally after 50 combinations ~~of~~ fish ~~all the same they~~ nevertheless began to move under the effect one magnet alone. ~~Conquest~~ Victory ! Fishes receive magnetic field. . But why they ~~that~~ so late ~~to~~ react to it? Usually reflex ~~kills~~/poorly is developed, when irritant is either too powerful or too weak. Our magnetic field (equal to 100 oersteds) approximately 150 times exceeded the magnetic field of earth. ~~It can be,~~ Perhaps it too powerful? They began ~~it~~ to decrease it, but ~~matter~~ it did not ~~yet~~ get better, but ~~with~~ at 10 oersteds reflex entirely disappeared. Then they ~~overturned~~ tried to increase field to 10 thousand oersted, but also this did not ~~aid~~ help. It remained to conclude that magnet in comparison with ~~world~~/light or sound is weak irritant, ~~how many~~ much its not ~~conditioning~~ intensity This in the same way as squeak even thousand ~~of dirofilides~~ mosquitoes remains weak in comparison with the voice of one person. Probably precisely due to the weakness of magnet so difficult to ~~reveal~~/detect its ~~action~~/effect on animals.

Usually to weak irritant not only reflexes are developed with

difficulty, but also itself/it has little effect on other, already ~~manufactured~~ produced earlier reflexes. They ~~overturned~~ tried to ~~check~~ control magnet in this plan/~~layout~~ and ~~was~~ obtained strange picture.

In aquarium ~~trigged hide~~ is fish with conditioned reflex to bell. We include sound, and it begins to move. Everything is normal. But ~~thus~~ here together with bell is brought magnet. What ~~such~~ is this? Fish remains calm, as if ~~do~~ it does not hear familiar sounds. We ~~test~~ try to replace magnet with ~~world/~~light, but we do not obtain this ~~/choking" action/~~"muffling" effect. That ~~It~~ is a magnet proves to be here more powerful than the ~~world/~~light. Generally conducts it itself as the strange irritant: on one hand, weak, but on the other hand - strong.

The even more unexpected results gave experiments on guppies. In them in no way it was impossible to ~~manufacture~~ produce conditioned reflex to magnet. At the same time the conditioned reflexes, which were ~~manufactured~~ produced with the aid of other irritants, magnetic fields ~~acted~~ was muffled ~~both~~ just as distinctly ~~and~~ as in fish~~es~~. This was more than strange~~ly~~. Until now, the researchers were confident that if the irritant is ~~re~~ perceived by animal, then to it compulsory it is possible to obtain conditioned reflex. But here ~~action/~~effect is present, but there is no reflex.

In order to explain all these strangenesses, it was necessary to explain, ~~without doubt~~ how magnet is received by animal.

Initially to us it seemed that to find answer/~~response~~ to this question is easy. Completely accidentally it was revealed/~~detected~~ that if we in fishes ~~manufacture~~ produce magnetic reflex, then already to the ~~world~~/light of reflex to develop not necessary: it appears itself. And, on the other hand, if we ~~manufacture~~ produce the conditional photic reflex, magnetic reflex appears as by itself. Sonic reflex did not detect this close relationship with magnetic. ~~Assigned itself~~ Suggested was the conclusion that the magnetic field is received just as ~~world~~/light, network eyes.

On this they wrote ~~and~~ in scientific publication. With the ~~action~~/effect of magnet some people ~~they~~ perceived weak glow. Magnet "~~it~~ did not sound", "did not issue odor", but "glowed" ! Everything spoke for the fact that if there is not the eye, the perception of magnetic field must be destroyed. How was our surprise and the disappointment, when eyeless fishes began to react to magnet not worse than the ones sighted ! That means retina here has nothing ~~not~~ with what. Mechanically continuing to give the usual set of conditional irritants, we suddenly saw, that our blind fishes react to ~~world~~/light ! True, ~~world~~/light they perceived more badly than sighted, but its completely ~~it is~~ distinct. And, most importantly, in them still brighter was reveal~~detect/exposed~~ed resemblance in effect

of ~~world/~~light and magnet. But now it is already difficult to say, whether magnet "glows" or ~~world/~~light "is magnetized".

Thus, our strange irritant is "~~it absorbed to~~ was selected as itself ~~in the~~ comrades" ~~world/~~of light. If they ~~the really~~/actually are "non~~differentiation of~~separable friends" ~~even~~ and one always accompanies another, then this facilitates search.

Let us compare conditioned reflexes with small filaments, then the brain, where are closed reflexes, ~~it~~ will be the assembly, which binds all filaments. Thus we began to ~~drive out~~ remove different sections of the brain of fish and each time ~~to look,~~ see if were preserved our small filaments - magnetic reflexes. the removal ~~/distance~~ of ~~prosencephalon~~ forebrain did not destroy them. When was cut the ~~average~~ mid brain, a little changed the only photic reflex: it became the same as in ~~the dazzleed~~ a blinded fish. They ~~moved away~~ removed the cerebellum disappeared sonic reflex, injured ~~intermediate~~ diencephalon brain - disappeared photic and magnetic reflexes.

To the physiologists it is known that the frog, if we place ~~the~~ crystalline particle of salt on its ~~intermediate~~ diencephalon brain, ~~leavs~~ holds leg from the dilute solution of sulfuric acid not ~~then~~ so rapidly, as it this ~~does~~ does without salt. The same ~~inhibition~~ delay of reaction we observed, when they acted on the ~~intermediate~~ diencephalon brain of frog by magnet or

~~world~~/light. That means magnetic field ~~really~~/actually is received by intermediate brain. Its removal/~~distance~~ in fishes led to the disappearance of reflex to magnet, in the same way as the destruction of hearing apparatus ~~aid~~ ceases the perception of sound.

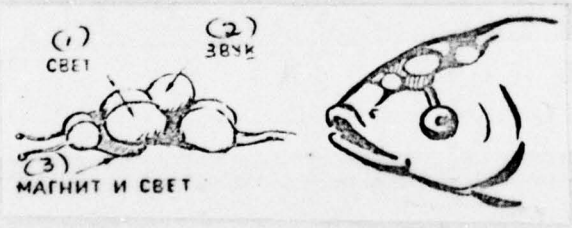
Our irritant not only strangely acts, but also strangely is received. For it, it proves to be, ~~not~~ not necessary special sense organ. It without difficulty penetrates everywhere, but it acts only on a definite ~~the determined~~ section of brain. If we accept this point of view, then it is possible to explain some strangenesses in the action of magnet.

Thus, with whatever irritant we dealt, excitation from it compulsorily traverses the intermediate brain. Magnetic field seemingly occupied here path at junction/~~unit~~ railway station and it detains the motion of other train-excitations. This is why magnet exerts strong braking ~~action~~/effect !

As weak irritant magnetic field cannot ~~auto ig~~ slip ~~sent~~ into other divisions of the nerve system and therefore ~~it~~ does not cause reactions. But if we help it ~~aid~~, if we use ~~apply~~ it together with the powerful irritant, which lays out the ~~line~~ way, then to magnet it is possible to ~~manufacture~~ produce conditioned reflex.

Let us return to our experiments. In fishes the reflexes are closed in intermediate brain. That means to the excitation, caused by magnet, it is here necessary to only a little move, and will occur the formation of conditioned reflex. In birds the conditioned reflexes are closed ~~b~~fore brain. ~~To~~ magnet there it is difficult to select, and therefore ~~to~~ it it is not possible to ~~manufacture~~ conditioned reflex in birds. It is possible that ~~on~~ man the magnet acts entirely differently.

Finally, resemblance to ~~world/~~light also can be explained by the direct ~~action/~~effect of magnet on intermediate brain. Specifically, this division of brain closely related ~~with view.~~



Key: (1). ~~World/~~light. (2). Sound. (3). Magnet and ~~world/~~light.

The eyes, actually, are the ~~apophyses~~ of intermediate brain. So that the excitation, caused by stationary magnetic field, most ~~of all~~ can be guided along the widest path - visual tract.

We finish conversation about strange irritant with a feeling of dissatisfaction, as if ~~they~~ are read only several leaflets of the middle of the most interesting narrative. Indeed remains still much unknown. How magnetic field in intermediate brain is converted into the nerve excitation? ~~As~~ How magnet does act on people? As to in practice utilize already known properties of magnet? Answer ~~responses~~ to these and many other questions can be obtained only as a result of the work of the researchers of the different specialties, which ~~supplied by~~ had as ~~target~~ purpose of explaining ~~communication~~ connections between the magnetostatic field and ~~the~~ life.

Experiments in Psychomagnetism

Professor of Leningrad university.

L. L. Vasil'ev.

The ~~action~~/effect of magnet, ~~is~~ more precise, by magnetic field, on ~~to~~ different organisms (biomagnetism), on the brain and the psychic phenomena (psychomagnetism) ~~leads~~ belongs to the questions, which ~~during~~ for centuries first are ~~manifested by~~ occupied the attention of the scientists, ~~first they~~ and then are discarded into the refuse box of pseudo-scientific searching, then again ~~they~~ surface, concentrated by new observations, and again they ~~are forgotten~~ were forgotten for many years .... Is noted at present the new lift of the interest in bio- and psychomagnetism, caused by fresh experimental data in works (A. Blyumenfel'd) on the magnetic properties of the dipole molecules of nucleic acids, which play this large role in the life of cells, including cerebric.

Serious observations on psychomgnetism were for the first time made by famous French neuropathologist Charcot and ~~Binet's~~ his successors Binet and 1880's were in the ~~eightieth years of past century~~. In essence they consisted in the following: in the hypnotized hysterical patient

with verbal suggestion was caused any visual, auditory or olfactory hallucination. Patient told to physician, that she sees on her hand butterfly, hears, for example, music or perceives smell of roses. If at this moment to her head they brought at a distance of several centimeters powerful horseshoe magnet, then the suggested hallucination weakened, disappeared entirely. The magnet was removed - hallucination was renewed. This remarkable phenomenon Was observed by no means in all patients and by the majority of subsequent researchers it was not confirmed. At the beginning of our century it was forgotten.

In 1919 I undertook the check of the experiments of Binets and Pere and, to my surprise, on just pen hypnotic performance with one healthy tested with complete certainty observed this picture. Soon it was possible to find an additional five persons, who experienced in hypnotic state the same effect.

I had the very powerful wavelike magnet, which held a load of one and one-half kilogram. Applying it, I could complement the data of the French authors by one additional unexpected observation. The place of the presentation of magnet to the head of tested value did not have, i.e., this could be occiput, vertex, front; but substantially in order that the plane of the symmetry of head would

pass between poles of magnet. In five persons tested magnet it would disturb the suggested hallucinations, when its North Pole was located opposite the left side of head, and south pole - against right, and only in one - in the reverse position of poles.

During July 1920 took place the first Petrograd physiological conversation - a university small circle, from which subsequently was formed the All-Union society of physiologists. During this meeting I offered to come forward with the report "about the effect of magnet on somnambulistic hallucinations" (theses of report are printed in III volume of the "Russian physiological journal" for the year 1921). Report caused the lively exchange of opinions. some would deny any effect of magnet, indicating that the hypnotizer can by careless questions direct the one tested to that, what it itself from it expects (reasonable objection, which was made even in times of Charcot's experience). Others advanced the reflector hypothesis of the effect of magnet, which was adhered to in his time Fere: directly on brain magnetic field does not act, at best it can be the weak irritant of skin receptors and receptors of the hair, which send the pulses of excitation to cerebrum. To this professor A. A. Likhachev added the following concept. Perhaps, the electrostatically charged hairs of skin and head are attracted by one magnet pole and repulsed by others, but this is considered by

hypnotist because of the frequently observed in hypnosis increase in the sensitivity.

Only two been present (one of them was professor G. P. Zelenyy) recognized possible the direct effect of magnetic field on cerebric neurons and the elapsing in them neuro-mental processes, after recalling in this case, which magnetic field penetrates through bones and soft tissues inside skull.

Against the hypothesis of the aiming action/effect of the verbal suggestions of hypnotizer I could advance a series of objections. On those which were hypnotized the experiments with magnet produced sometimes those, who did not know, which one should expect results. Magnet could be covered into matter so that experimenter would not know the arrangement of poles, and all the same magnet it would act in one position of poles and it would not act with other. Finally, approach/approximation to the head of any metallic or woolen object/subjects, which do not possess magnetic properties, to the suggested halucination of effect did not exert. / True, after the multiple repetitions of these control experiments alternately with "magnetic" nonmagnetic object/subjects gradually acquired the ability to influence hallucination. Apparently, this occurred as a result of the formation of conditional reflexes on the basis of the unconditional action/effect of magnetic field on the cerebral cortex

of brain.

Subsequently for me it was possible to demonstrate these phenomena to academician V. M. Bekhterev and the specially assigned by him board. In young years academician Bekhterev worked in Parisian clinical aspects of Charcot and for life preserved interest in the ~~action~~/effect of magnet on the hysterical patients. Board confirmed the results of several experiments. one of them attests to the fact that with shallow hypnosis and weak because of this manifestation of the suggested hallucinations the magnetic field does not ~~attenuate~~/weaken, but, on the contrary, amplifies the suggested hallucinations.

All these observations led to assumption about the fact that magnetic field is capable of amplifying the carotid inhibition of crust neurons. It, of course, needed reinforcement by experiments on animals. At first selection was made to frogs. By the means of simple attachment animals were pulled up by rear extremities, and they hang downward by head. This put them for some time (sufficiently constant for each of them) into motionless hypnotic state. By stopwatch was determined its duration, and from a number of experiments was derived average value. To frog was brought the same magnet, which served for us in tests on those people which were hypnotized. With the indefinite arrangement of magnet poles only a little

~~It~~ increased the average duration ~~and from series of experiments she was derive/concluded average value. To frog was brought the same magnet, which served us in tests on the hypnotized people. With the indefinite arrangement of magnet poles only a little increased the average duration~~ of hypnotic state (2.733 minutes against 2.045 minutes, i. e., by approximately 33 percent). The difference was more expressed (3.136 minutes against 2.045 minutes - 53 percent) in 11 experiments ~~on the determined~~ position of poles - themes very, in which in experiments on people-hypnotists we observed the state of the depression of carotid braking.

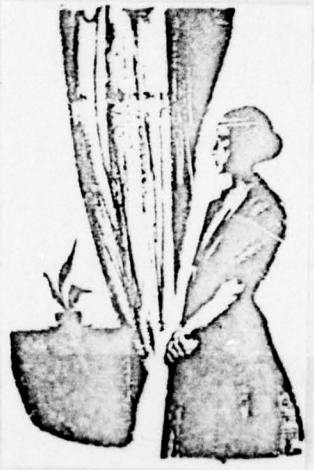
Later ~~in~~ the institute ~~of~~ brain I placed experiments together with practicing students on the effect of the same horseshoe magnet on generated in them motor conditional reflexes of hand; as unconditional irritant served the electric current, started into the fingers of the same hand. In 12 experiments, carried out ~~to~~ four tested, furthermore predominated the ~~braking~~ effect of magnet. In sharper form this braking effect of magnetic field on the conditional reflexes of fishes and pigeons was establish~~installed~~ by Yu. A. Kholodov in 1958. In the first place, the braking ~~action~~/effect of magnetostatic field reminds the suppressing effect of the positive pole of direct ~~of~~ electric current - the anode. The sharply stimulating action of electric field, on the other hand, is similar to the ~~action~~/effect of classical irritant - cathode. This does not ~~that~~

means however that the magnet cannot exert the stimulating ~~action~~/effect. Was expressed the opinion that the moving ~~driving~~ magnet, and variable magnetic field, guides ~~aims~~ in the nerve tissue the electric currents of superthreshold force. For example, long already it is known that the alternating magnetic field of great ~~large~~ force ~~the~~ caused flickering in eyes of man, so-called phosphenes. ~~In~~ In collaboration with Ye. T. Gal'vas, Ya. I. Perikhan'yantsem and ~~M~~ P. V. Terent'yev and myself (transactions of the institute of the brain of the name Bekhterev, ~~that~~ Vol. XVIII, 1941-1946) by powerful horseshoe magnet it was possible to cause ~~photic~~ light phosphenes in woman, who preliminarily accepted the dose of "payote" (mexican cactus, containing mescaline and other alkaloids). This preparation causes unusually the powerful and prolonged excitation of visual region of cerebric cortex. When are screwed up eyes, in the field of view ~~volitionally~~ there spontaneously appear and kaleidoscopically change each other extremely bright and coloring visual ~~notes~~ images. Of our tested, ~~that~~ who ~~was~~ were being located in dark room, the rapid adjustment of magnet downward at a distance several centimeters from postcranial region each time caused the appearance of the moving ~~driving~~ phosphene in the form of "trace from ~~shooting~~ falling star" (according to its expression).

Little understandable, but very is significantly another phenomenon, which was being observed by us in the same experiments: when the magnet, approximated to the occiput of tested, ~~they~~ person was turned ~~to~~ 180 degrees, then this many times it caused in a row the same

rotation of spontaneous visual mode.

It is necessary to assume that further research on psychomagnetism promises the solution of many mysteries of the work of brain.



"Especially ~~it~~ striked ing her ~~its~~ exterior ~~fine~~/thin metallic band, as if diadem ~~is~~ ~~its~~ which covered ~~front~~. her forehead

- this is ~~son~~ mama, ~~he~~ said Lemansel. - ~~he~~ she has migraine.

~~The Mr~~. Mrs. Lemansel' ~~were~~ greeted ~~with~~ me ~~by~~ with sorrowful voice and probably after noting, ~~as~~ how astonished I looked ~~by it in front~~. at her forehead she

said with the smile:

- Ia not think, young person that these are ~~the corona~~ crowns: this simply magnetic band from headache".

(Anatole France, in "Red Egg").

Permian period. the medical institute.

DEPARTMENT OF NORMAL PHYSIOLOGY.

Here under professor M. R. Mogendovich's leadership management the group of the researchers conducted extensive work on research on the ~~ation~~/effect of magnetic field on vital processes.

On the results achieved by them, about conclusions and ~~assumptions~~ proposals speaks the scientific worker of laboratory the candidate of the medical sciences R. G. Skachedub.

~~assumptions~~ Proposals, conclusions ....

Magnetic field is one of the real factors of environment, and its effect on living organisms are undoubtedly necessary to consider in biology and medicine.

Permanent magnet influences the properties of the blood.

In magnetic field the blood is coagulated more slowly.

It was for the first time shown, that the leukocytes - the white blood ~~ball/spheres~~ globules, protecting organism from microbes, in magnetic field become more active. Thus, are ~~raised~~ increased the ~~shielding~~ protecting properties of organism.

Is ~~opened~~ revealed the "phenomenon of Mogendovich" - the retarding/~~deceleration/delay~~ of the precipitation of erythrocytes (red brown ~~ball/spheres~~ globules) in magnetic field. ~~The~~ professor Mogendovich considers that this is the result of the action of external magnetic field on the electric and magnetic properties of erythrocytes. Erythrocytes begin to move in a circle, and ~~is~~ possibly, ~~and to~~ rotate around ~~its~~ their axes.

Permanent magnet changes the permeability of animal cells and tissues. Investigations ~~they~~ were conducted on the isolated/~~insulated~~ living muscles of frog. It turned out that the weight of muscle,

which was ~~being~~ located in special physiological solution, is increased more, if it ~~are~~ is exposed to effect of magnet. The same results were reached by another method - the lifetime staining of skeletal muscles. Muscle, which is located in magnetic field, absorbed more color ~~paint~~, than others.

The action of magnet decreases the necessity of organism for oxygen, lowering the ~~common/general/~~ total level of gas exchange. This was establish~~/installed~~ed in the series of tests on white mice, which in the special glass chamber (glass permeated for a magnetic field) placed between the poles of constant electromagnet.

It is obvious that magnetic field suppresses the nervous system. ~~By~~ this ~~it is possible to~~ can explain that the ~~action~~/effect of magnet decreased the pain of wounded. (This treatment was applied in ~~the~~ Perm~~/ period~~ during Great patriotic war).

Of the existance of the phenomena of biomagnetism it is possible to convince any. It suffices to place the head of man between the poles of the electromagnet even of the small force: the switching on and ~~the disconnection~~ of electromagnet is accompanied by the perception of flashing ("magnetic phosphene"). Some in

~~full/total~~/complete darkness see the brightness of the electromagnet itself, which disappears with the disconnection of current.

There
Are such data, that characterize in essence the problem of biomagnetism at present. Is made not so much, but also not so ~~it is~~ little
~~small,~~ if we consider that ~~mist,~~/fog, which surrounded until recently these questions.

WILL BE REQUIRED BY THE FUTURE ASTRONAUTS MAGNETIC COMPASS?

Although the astronaut, notes the American scholar McCracken [Massachusetts Technological Institute], will not need the information about magnetic fields for space navigation, they can be used for the purpose of the protection of man from the intense, lethal radiation, which from time to time is ejected by the Sun.

Magnetic lines of force have great importance for the propagation of the radiated by the Sun cosmic rays. Electrically charged particles can freely move along magnetic lines of force, rotating around them on spirals. But to intersect them by them is very difficult.

Thus, magnetic lines of force served as if channel for particle motion, emitted by the Sun. Therefore they have great value for the understanding of the nature of cosmic rays and bonded with them phenomena, observed in the Earth, and also for the flight safety of the future astronauts.

If astronaut is have the contemporary ~~map~~/chart of the magnetic fields of interplanetary space, then he will be able to avoid the incidence/~~impingement~~ into magnetic field, maneuvering with ship and passing the zones, where lines of force are connected with the Sun. Then, even if ~~it~~ there will occur sudden outbreak on the sun with the ejection of lethal particles, spacecraft will be shielded from their action.

250 Thousand Gauss.

In the special laboratory of the higher technical school of Massachusetts (USA) there will be constructed the magnet with the strength of field in 250 thousand Gauss. Along with purely physical investigations on giant magnet it is proposed to study the effect of magnetic field on human organism.

(Atompraxis, 10/11 1960).

MAGNETIC PILLS.

The ancient physicians used magnet not only for an extrinsic ~~action,~~ effect but also they gave ~~to~~ it to patients inside. The Egyptians, for example, looked at magnet as at the ~~substance~~ means, with the aid of which it is possible to achieve immortality. But were such, who asserted that the magnet is a poison, and antipoison from it - garlic juice.

The theoretician of antique medicine Galenus considered magnetically stable substance. Wise Avitsenna treated by the magnet ~~of~~ hypochondriacs. Paratsel's prepared from it magnetic manna, and Agricola - salt, oil and essence.

Thus one of the methods of the "treatment" of Paratsel's: "~~Is~~

"Take the magnet, died ocher, and ~~it is~~ buried in the ~~earth/~~ground; on it are poured the seeds, inoculated with ~~that~~ the same ~~illness/sickness/disease, which in~~ as that of patient. For the acceleration of increase it is necessary to pour on them by that water, by which the patient washes herself. As soon as these seeds ~~will~~ grow patient gets better".

[redacted].

2). And in this case the bactericidal ~~action/~~effect of the aeros

Page 84.

Rostov-on-Don.

Institute of roentgenology, radiology and oncology.

M. A. Ukolova and G. G. Khimich:

PERMANENT MAGNET AFFECTS INCREASE IN SARCOMA

in the experimental division of our institute are carried out two series of observations of the ~~action/~~effect of permanent magnets on the sarcoma of white rats. Magnets are applied of assorted composition and different force. In the first series of experiments we take the magnetized rings of steel wire, which are fastened around neoplasm. To control rats fasten the same annuli, but not magnetized. In 60o/o of animals with neoplasms from 1 to 1.5 cm. in diameter, subjected to the effect of magnet, will occur resorption of sarcoma.

The neoplasms of larger size/~~dimension~~ are not decreased. Not in one of the control rats ~~of~~ was resorption ~~it is~~ observed.

In the second series of experiments are applied the magnets from the alloy ~~of~~ ANKO-4 with induction 1100 gauss. In a number of cases occurs the resorption of the much larger neoplasms: to 6 x 3 cm.

It is possible to assume that the physical effects of this type are ~~bonded~~ connected with those discovered in 1958 by professor L. A. Blyumenfeld by the properties of the magnetic polarization of the nucleoproteins of living cells.

PROTECTION FROM LETHAL RADIATION DOSES.

The American researchers M. F. Barnotti and D. M. Barnotti ~~communicate~~ report that if we hold mice for several weeks in the field of powerful permanent magnet, then in them it is observed leukocytosis - ~~it grow~~ the ~~rises a~~ quantity of white blood cells in ~~the~~ blood increases. A maximum increase in the quantity of leukocytes (to 30-60o/o) is noted during of the first two weeks after removal of animals from magnetic field.

These data will allow the scientists to construct the following working hypothesis. If we treat by the magnet of mice in which under the ~~action~~ effect of the ionizing radiation are disturbed the hemopoietic functions of bone marrow, then little it is developed white blood ~~cell/spheres~~ globules. Was made a series of the experiments, which to a determined degree will justify the prognosi of the scientists. Mice ~~the~~ subjected to preliminary action fields of permanent magnet more easily ~~transfer~~ carried the radiation doses, lethal for animals under normal conditions.

IS FEASIBLE NEW METHOD OF DIAGNOSIS OF CANCER.

In the English scientific journal "Nature" ~~will~~ there appear ed the report ~~communication~~, that the American scientists F. Senftl and A. Thorpe, possibly, ~~will find~~ have found the new method of the diagnosis of cancer. They ~~run~~ ran experiments with the cancerous tissue of the liver of rats and ~~they will~~ establish ed that the magnetic properties of sick tissue and tissue ~~sound~~ healthy were not identical.

If, they note, that further experiments will show that the same difference is characteristic for other form s ~~species~~ of cancerous diseases, then "the measurement of magnetic properties ~~it~~ will be possible to apply for the purpose of diagnosis".

But plants? Are subjected they to the ~~action~~ effect of magnetic field?

MAGNETOTROPISM.

Who has not played in childhood with magnet, forcing "to dance" nails and metallic pearl! But for sure you did not are trying to attract ~~tighten by the~~ with magnet ... plant. But this almost is possible. Recently coming from family of roots is completely clearly drawn to the side of south plus. . This surprising phenomenon will was discovered by candidate of biological sciences A. V. Krylov. He called it magnetotropism.

For the last ~~latter~~ several years under his management at the institute of the physiology of plants im. K. A. Timiryazeva's the Academy of Sciences of USSR conduct curious works on research on the effect of magnetostatic field on the vital activity of plants. Untimely death interrupted the experiments of scientist. Many ideas remained those which were not accomplished, the most interesting hypotheses - not proofed. Now investigations are continued by his coworkers and the comrades, expecting to find to this means much new and valuable.

What is magnetotropism? Before us the basic theoretical conclusions to which arrived on the basis of the hundreds of experiments of A. V. Krylov and his G. A. Tarakanov's collaborator.

Does not occur this case in order that plant would be mistaken - would grow upward by roots, downward by leaves. In a strict order is constructed each cell in living organism; its side are nonhomogeneous. In exactly the same manner, for example, usual cabbage leaf has the right and left halves ....

Why precisely thus? Why not otherwise? They say that the cell is polar: its end are not identical. Is polar the plant: sharply are distinguished roots and the upper sprouts. But what such is polarity? In what is the essence of this phenomenon? In the word itself "polarity" is laid the concept of field. The most universal form of the manifestation of field, i. e., motion of mater, its electromagnetic state. All substances have to some degree magnetic properties; this is the physical basis of those complex processes, which occur in living organisms and determine their increase, development. We frequently say that any leaf is the whole chemical plant. Each proceeding there reaction, in turn, leads to a change

magnetic properties, appear electric potentials - biocurrents. Biocurrent already itself changes the ~~character~~/nature of the magnetic properties of substance. Thus, is created the closed circle, the indissoluble unity of electromagnetic field with living system. Each time depending on conditions there originate one or the other electromagnetic state, and it determines the polarity of entire organism.

Here is ~~Thus and~~ the answer/response: polarity is the property of living matter, which determines the metabolism of organism. But at the basis of polarity lie ~~exist~~ the magnetic properties of substances.

"It is ~~necessary~~ possible to consider ~~count~~, writes A. V. Krylov, that physical basis, which determines the continuity of the conversions of substances in organism, is uncompensation (asymmetry) of electromagnetic forces, in other words, asymmetry of polarity. In this case, apparently, by no means it is indifferent as shifted electromagnetic field: to the side of positive or negative sign".

Thus, polarity is a basis of bases; depending on its state are amplified or are inhibited vital processes, can occur (their even) ~~full/total~~/complete disorganization, which leads ~~drives~~ to the death of separate cells and organ~~/controls~~, and then ~~but that~~ also entire organism.

Thus far this is hypothesis. . Far going, opening captivating prospects. It makes it possible to approach in a new way the study of the most important problems of biology, such, for example, as heredity. ~~It can be~~ Perhaps, precisely, this path will lead to the development of the efficient and reliable methods of control of increase, development, the life of plants and animals.

As the basis of hypothesis are placed the real facts, checked by experiment. Here are they.

From the report of the laboratory:

I. The magnetic field of earth must have a direct/~~straight~~ effect on the vital activity of plants. This will confirm experiments.

II. The seeds of grain, maize, cotton plant are placed in the humid glass chamber. On special support/~~socket~~ was stuck filter paper whose ~~end~~ ~~leads~~ are ~~slitted~~ lowered into vessel with the tap or distilled water in order evenly to wet paper. Part of the seeds was oriented by rootlets of ~~nucleus~~ germ to the northern magnetic band of earth, another - to south. Germination was produced in darkness, at temperature plus

18-25°.

It is necessary to especially maintain completely essential for such experiments the part: necessary to take the only dry seeds: if they are preliminarily wetted or turning up, then the effect of magnetic field sharply weakens or completely is lost.

Under such conditions we germinated the seeds of maize of type "Voronezh-76" and ~~will~~ establish~~/install~~ed (see photo 1) that those seeds, which were directed by rootlets of nucleus toward the south magnetic pole of earth (2), germinated ~~to~~ a day earlier than the seeds, turned by rootlets of nucleus to north magnetic pole (1). Furthermore, in ~~by pen the~~ first case an increase in the roots and stems ~~haulas~~ will be more intense. and sprouts from the seeds, turned by rootlets of nucleus to the north magnetic pole of earth, were bent and ~~they~~ grew ~~increase~~d in the direction of south magnetic pole. The same law ~~will~~ show the seeds of the wheat of type "red-grain" (3 and 4).

This phenomenon ~~named~~ was called magnetitropism.

III. Was ~~I~~ studied the ~~action/~~effect of magnetic field, created by artificial permanent magnets. For these experiments was designed special instrument.

On photo 2 is evident the intergrowth of the seeds of grain placed into artificial magnetic field. Earlier ~~will begin~~ began to germinate those of them, rootlets of ~~nucleus~~ germ of which was directed to south magnet pole. Are confirmed the same laws, which were noted earlier.

IV. Traced we the simultaneous effect of magnetic field and chemical substances - stimulators.

We consider that the ~~action~~/effect of such substances on rate and ~~character~~/nature of ~~increase~~ growth and the development of plants must be examined first of all from the viewpoint of the possibility of change ~~earth~~ under by their effect of the state of polarity. For our experiments we select giberellin. With its solution/opening are filled the tiny opening ~~apertures~~, made in the dry ~~families~~ seeds of wheat "red-grain."

As is evident in photography 3, gibberellin exhibits its ~~action~~/effect on an increase in the sprouts differently.

In such a case, when seeds were oriented by rootlets of ~~nucleus~~ germ to the positive pole, gibberellin more powerfully ~~it~~ stimulates its ~~increase~~ growth. This testifies that one and the same substance under conditions of the different state of polarity exhibits its

~~action~~/effect dissimilarly.

Experiment shows and another very important side: polarity can change with the aid of chemical substances, in particular with the aid of gibberellin. If usually sprouts more actively ~~increase~~ grow to south pole, then with interference of gibberellin we see opposite picture. Comprehensive research on the polar (magnetic) properties of stimulators and inhibitors of increase will render great aid in the understanding of the mechanism of their ~~action~~/effect.

V. Polarity plays the role also in the immunity of plants - their ability to resist diseases. The sprouts of the seeds, oriented by rootlets of nucleus to north magnetic pole, densely occlude by parasites - mold fungi (photo 4, to the left). the resistivity of these sprouts will be clearly ~~lowered~~/reduced. Entirely appear in another way the sprouts of the seeds, oriented to south magnetic pole (photo 4, on the right), although the conditions will be equivalent.

All these facts indicate that the electromagnetic state (polarity) is the most important factor of the vital activity of plants.

Captions
~~Signatures~~: ~~the~~ candidate of biological sciences A. V. Krylov, G. A. Tarakanova.

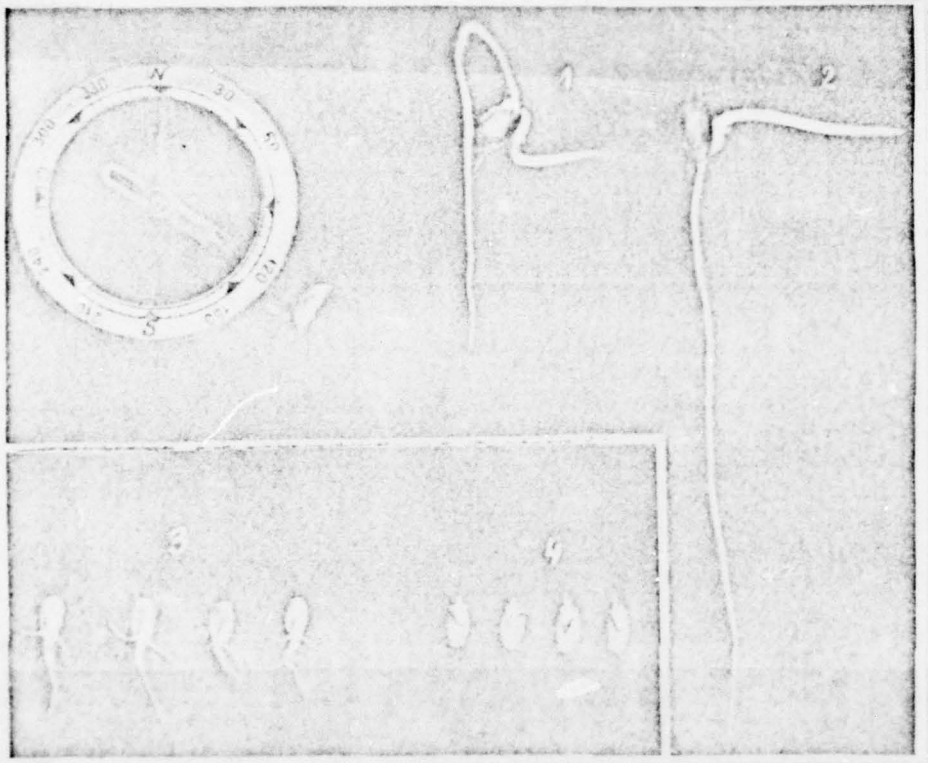


Photo 1.

Photo 2.

Photo 3.

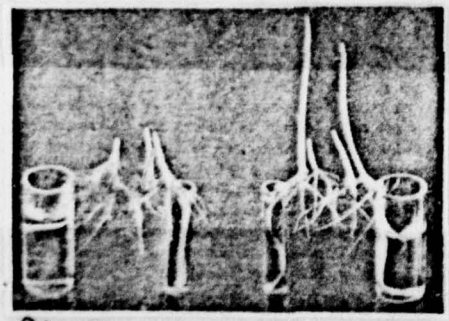


Photo 4.

DESERVES ATTENTION. [p. 85 of original]

The effect of magnetic field on living organisms ~~will~~ has become the ~~object~~/subject of real studies only in the ~~quite last~~/latter most recent years, although the searches in this direction are undertaken from old times.

Only recently this phenomenon will be strictly scientifically proved on plants. The merit of this discovery/~~opening~~ belongs to Soviet/~~scholarly~~ scientist Aleksandr Vasilyevich Krylov.

Already the first experiments showed that with the germination of seeds in magnetostatic field an increase in the sprouts sharply is accelerated during the orientation of rootlets to south magnetic pole. ~~This will be~~ These were the first scientifically established facts, which lie as the basis of experiments.

It is difficult at present to foresee all the scientific and practical consequences, which ~~it~~ can be given by investigation of magnetotropism of living beings. However, already now there is no

doubt that we deal with the new, previously unknown property of living matter whose research deserves the most careful attention.

Life on the Earth ~~stored~~ was added up in the determined magnetic field, characteristic to our planet, and this, of course, had to be reflected in the evolution of life and to peculiarities of the organization of metabolism. Therefore the abrupt changes in the magnetic fields, which the organisms can be subjected ~~to~~ both on the Earth, ~~and~~ and in particular on ~~leaving~~ going into space, are capable, probably have essential effect on the different sides of their vital activity.

We hope that the space ships - the researchers of outer space will bring ~~many~~ much new data on the effect of magnetic fields on living beings.

Academician A. L. Kursanov.

English professor's experiments L. D. Odas (Belford college).

1960

Was investigated the effect of magnetic field on ~~an increase~~ growth in the plants. For this purpose was used large permanent magnet. the maximum strength of field reaches 4 thousand gauss. Experiment is conducted as follows. In sterile conditions in the small glass chamber on nutrient agar ~~grow~~ grew the sprouts. The chamber, ~~establish~~ installed between magnet poles, rotates in horizontal plane (this was necessary for ~~relieving~~ removing the ~~action~~ effect of the earth's gravity). Observations ~~they~~ were conducted on ~~after~~ roots of plants. Head of root and the section of closest pole was photographed after each of 10-15 minutes. Made the vast number of experiments and in all cases - with very rare exception ~~elimination~~ - ~~roots they detect distinct by exception/elimination~~ - roots ~~they~~ revealed ~~detect~~ distinct bendings, rootlets ~~it is~~ were deflect ~~diverted~~ to the side of ~~the smaller~~ less strength of the field of magnet, seemingly ~~it~~ departing from its ~~action~~ effect.

The determined changes are observed in the internal structure of

cells. Special attention was directed to grains of starch; them formed drops more on that half of the cell, which ~~is arrange~~ was located nearer to the concave side of root, i. e., further from magnet. It is possible to assume that in cell there is some mobile ~~motile~~ material, which is distributed (and carrying off after itself starch grains) by action of magnetic field in the same manner as ~~for~~ under the ~~action~~ effect of the force of the earth's gravity.

ARE NECESSARY ~~BUT~~ MORE PRECISION METHODS OF STUDY.

considers the candidate of biological sciences, head of biophysical laboratory of central institute of health resort science and physiotherapy A. S. Presman

the magnetic phenomena we ~~ve occur naturally ourselves~~ encounter in nature everywhere - from the magnetic properties of electron and atom to the grandiose magnetic fields of space.

On the Earth in the process of evolution everything living had to be adapted to the stationary field of terrestrial magnetism. It is known, however, that this field in the course of time undergoes change beginning from daily variations to extremely slow changes - the so-called secular variations. Especially abrupt changes (magnetic storms) occur in the periods of the maximum solar activity. There is no doubt, that all these changes one way or another manifest themselves the functioning of living organisms. It is possible that the noted during the greatest solar activity deterioration in the state of people with cardiovascular and nerve diseases to some degree

is connected with magnetic storms.

On the processes of vital activity it can, to pronounce and the stay in the ranges of magnetic anomalies, where the magnetic intensity ten times is higher than usual. This must affect plants and animals. It is even more probably the biological effect of the artificially created magnetostatic fields in laboratories and in the industrial enterprises, where the intensity is already tens of thousand of times more than the natural fields of earth.

In numerous experiments the scientists observe the effect of powerful magnetic fields. But no one still not it will be impossible to detect the action of weak natural magnetic fields on living organisms. Does this indicate that such effects are absent? Probably not. Are necessary the more precision methods of studies, and there can be, another approach to the very evaluation of biological effect.

The role of magnetism in biological phenomena, apparently, is not limited only by effect of external magnetic fields on living beings. It is very probably that the magnetic reactions are one of the important sides of vital activity, one of the main participants of the intimate processes, which take place in living cells, one of the means of control of these processes. Such we can be ideas expressed in connection with the

works of L. A. Blumenfeld, who investigated magnetic properties of the molecules, which form part of the principal part of the living cell - its nucleus.

~~We~~ would want to note that, studying the mechanism of the biological effect of magnetic fields, one should remember about the fact that ~~which~~ the processes, which occur in living cell, do not always succeed in squeezing into in the strict basis of the physical laws, valid for an inanimate nature. Repeatedly were presented the hypotheses that for the understanding of biological phenomena it is necessary, perhaps, to construct the building of new physics, in the same way as this happened in its time during the investigation of microcosm. It is possible that research on magnetic phenomena in living cell will be the first ~~calculus~~ stone in the construction of foundation for such physics.

PHYSICIST'S ~~OBSERVATIONS.~~ Remarks

Any investigation of the physical action on vital processes must be accompanied by the careful analysis not only of the biological, but also physical side of experiment. Unfortunately, in works on the biomagnetism ~~of~~ this not it is evident. That which was ~~opened~~ discovered already by Faraday the fundamental law of electromagnetic induction says, that any change of the magnetic field stimulates (~~it~~ induces) in conductive bodies the electric current whose force depends not on the ~~quite~~ very magnetic field, but on the rate of its change.

~~For~~ For any organism, which has the nervous system, the transmission of excitation is conducted by electric current. And completely it is natural that the excitation in nerves or the brain of electric currents acts on organism. But indeed as a result of the inclusion and ~~in~~clusion of the magnetic field into all internal tissues, in particular in nerves and brain, is stimulated current in accordance with their conductivity. It is extremely desirable in greater detail to investigate the ~~action~~/effect of the induced currents on the nervous system. But only one ought not to call this "biomagnetism"

and all the ~~theme~~ more by the "~~action~~/effect of residual magnetic field". Biological effect in all experiments ~~on connection~~/with the inclusion and ~~disconnection~~/exclusion of magnetic field produces electric current.

Well, and ~~without doubt~~ how is ~~matter~~ it, if in experiments is used the permanent magnet, which ~~include~~/connected ~~and~~ cannot be disconnected and? And in this case ~~during~~ with approach/~~approximation~~ or ~~during~~ with the removal/~~distance~~ of magnet are stimulated electrical currents, only weaker (~~that as~~ since motion of magnet ~~it~~ occurs more slowly than connection or disconnection). The excitation of currents occurs ~~and~~ ~~then~~, when with respect to magnet moves the object, for example, the fish swims in the field of permanent magnet. From this viewpoint not one of the experiments, which claim to research on biomagnetism, is not pure/~~clean~~: indeed are not excluded the completely induced currents. Worse than that, ~~on~~ the results of experiment had to ~~manifest itself~~ affected by such uncontrollable factors as the speed of ~~the locomotion~~ movement of magnet.

Possibility of the electric effect on the nervous system is obvious. Hardly it is possible to doubt also the fact that the magnetic fields here act only through the induced currents. That means in application to the nervous system, one should speak not about biomagnetism, but about bioelectricity.

Is incomparably less clear the question concerning the ~~action~~/effect of magnetostatic field on lowest organism or isolated tissues, which the nervous system do not have. Here is not excluded direct/~~straight~~ effect on the motion of charged particles (as ~~this~~, for example, it is observed in experiments on the coagulation of colloids). But ~~is~~ which biological effect from this ~~action~~/effect, to judge thus far is difficultly, since the published experimental data are contradictory. In Rome already more than 30 years there has existed a special institute of electrogenetics. The director of this institute, Alberto Pirovano ~~is known breeder~~ published from fifty works, in which he asserts that by the ~~action~~/effect of low-frequency or even magnetostatic field it it is possible to cause hereditary changes of plants. But confirmation on the part of other researchers these results will not obtain.

The question concerning direct/~~straight~~ (besides the nervous system) electromagnetic control on living substance is very urgent and requires careful testing. But it seems to me that all the possible effects must much more brightly be exhibited under the effect of high-frequency variable fields, i. e., radio waves. Magnetostatic field most more interestingly would be to test in combination with variable fields. This method widely is used in the works of L. A. Blyumenfel'd and other researchers for research on living substance. But one ~~ought~~ should not to have checked (other somewhat experimental

conditions) action on it? It is possible to expect that will be revealed the interesting phenomena, well familiar to the physicists, but for biological purposes still in no way used.

Doctor of Physics and Mathematics, professor D. A. Frank-Kamenetskiy.

[p. 89 of original]

"For astronautics I consider very important the question concerning the possible protective action of magnetic field in the relation to the ill effect of the ionizing radiation on organism. But question requires special development, and thus far ~~against~~ about this nothing that which was determined cannot be said still".

Professor M. R. Mogendovich, chairman of department of the normal physiology of Perm[illegible] medical institute.

HYPOTHESIS OF Candidate of Biological Sciences.

G. M. Erdmann

the findings ~~drive~~ prove that the magnetic field directly acts on the nervous system. This, probably causes physicochemical changes in metabolism, which can be ~~bonded~~ connected with the formation of conditional reflexes, on which depends the behavior of animal.

Thus, almost all ~~come forward~~ appearing scientists consider that the research of the doctor of chemical sciences, managing ~~by~~ the laboratory institute of the chemical physics of the Academy of Sciences of the USSR L. A. Blyumenfel'd will ~~bear~~ carry to the problem of biomagnetism the so~~/such~~ long-awaited proof.

This is what ~~speaks~~ L. A. Blyumenfel'd, page.

THE PROBLEM OF BIOMAGNETISM.

Perhaps not on one scientific question appeared in world literature as ~~many~~ much as the mutually contradictory confirmations, ~~as~~ concerning ~~that~~ the question, does ~~exert~~ exert permanent magnetic field any effect on biological processes and living beings.

For the ~~latter~~ last of one hundred years (up to our days) from time to time are printed the scientific works whose authors ~~communicate~~ report that they observed this effect of magnetic field. Then, as a rule, other scientists publish the works, which deny previously the obtained positive results.

I do not know up to now ~~not~~ of one experimental fact, which unambiguously testifies to the existence of such effects. All results either are statistically uncertain or they can be explained by the electric effects, which appear with ~~connection~~/inclusion and ~~disconnection~~ exclusion of magnetic field or during the motion in it of the objects of measurement.

Thus, to the question concerning ~~that~~ whether, acts or does not act magnetostatic field on living beings, at present there is no answer/~~response.~~

Some authors refer to the discovered in our laboratory new magnetic properties (the so-called "pseudo-ferromagnetism") of nucleic acids and nucleoproteins, and also to a change of these magnetic properties in the process of an increase in the unicellular cultures as to the proof of the existence of biomagnetism.

This is based on misunderstanding. We study not the effect of magnetic fields on any biological subjects or processes, but the magnetic characteristics of most important biological structures. The observed by us magnetic properties are such, that the available in laboratories magnetic fields cannot to any noticeable degree influence the chemical and other characteristics of biopolymers (energy of magnetic reactions are considerably less than thermal energy).

Of course, it is not possible to completely exclude the possibilities of the governing effect of weak magnetic reactions and their changes in the process of development to the course of biological process, for example, at the level of cell. In complex macrosystems energetically very weak interactions can lead to great effects, approximately so, as pushing of knob can cause powerful explosion. However, there are no proofs of the presence similar effects as yet. We in our work examine magnetic properties only as indicator of the important special peculiarities of the electron structure of the objects being investigated.

I is not completely confident in the fact that research on the effect of magnetostatic fields on biological systems is of considerable interest. Scarcely whether it is possible to expect ~~large~~ great effects, at least because ~~then~~ they already they ~~will reveal/detect~~ could be detected. But in science ~~ever~~ it is ~~not~~ never possible to previously consider these or other investigations hopeless. In any case, at present most of all are necessary the reliable facts, as yet, unfortunately which are not present.

~~[redacted] 1742.~~

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